

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau(43) International Publication Date
24 December 2003 (24.12.2003)

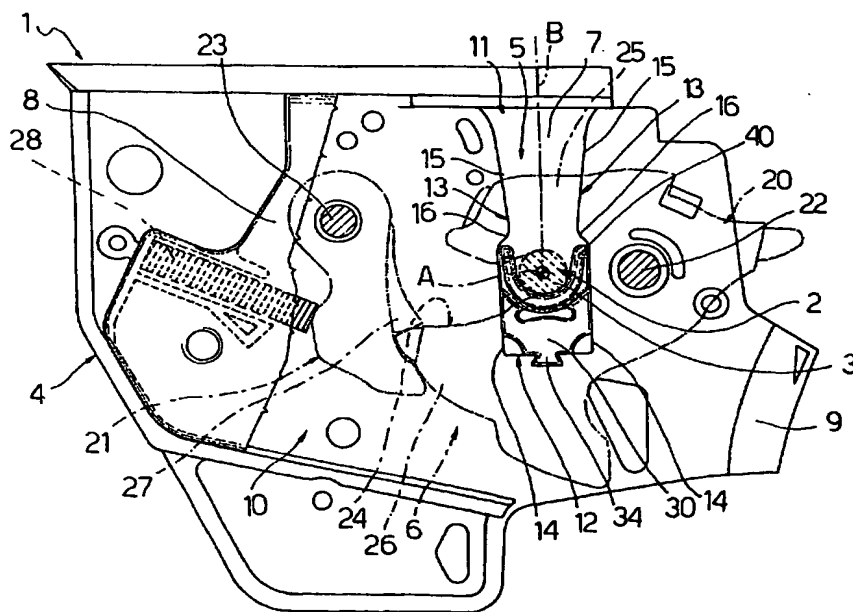
PCT

(10) International Publication Number
WO 03/106793 A1

- (51) International Patent Classification⁷: **E05B 65/32**
- (21) International Application Number: PCT/IT03/00369
- (22) International Filing Date: 13 June 2003 (13.06.2003)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
T02002A 000512 14 June 2002 (14.06.2002) IT
- (71) Applicant (for all designated States except US): **INTIER AUTOMOTIVE CLOSURES S.P.A.** [IT/IT]; Corso Allamano, 70/5, I-10090 Cascine Vica-Rivoli (IT).
- (72) Inventors; and
- (75) Inventors/Applicants (for US only): **CETNAR, Roman** [CA/CA]; C/O Intier Automotive Closures INC., 521 Newpark Boulevard, Newmarket, Ontario L3Y 4X7 (CA). **OT-TINO, Franco, Giovanni** [IT/IT]; Via Ippolito Nievo, 8, I-56017 San Giuliano Terme (IT).
- (74) Agents: **JORIO, Paolo et al.**; C/O Studio Torta S.R.L., Via Viotti, 9, 10121 Torino (IT).
- (81) Designated States (*national*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.
- (84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).
- Published:**
— with international search report

[Continued on next page]

(54) Title: A LOCK FOR A DOOR OF A MOTOR VEHICLE



(57) Abstract: Described herein is a lock (1) for a door of a motor vehicle provided with: a closing mechanism (6) designed for coupling with a lock striker (2) along a direction (B) of relative coupling; a supporting body (4) of said closing mechanism (6) presenting a housing seat (5) for an engagement portion of the lock striker (2); and elastically compliant arrest means (30) delimiting the housing seat (5) at least in the aforesaid direction (B) of relative coupling in order to define a damped arrest of the engagement portion (3) of the lock striker (2). The arrest means (30) are coated on their surface, in the area of interaction with the engagement portion (3) of the lock striker (2), by a rigid protective shield (40).

WO 03/106793 A1



— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

A LOCK FOR A DOOR OF A MOTOR VEHICLE

TECHNICAL FIELD

The present invention relates to a lock for a door
5 of a motor vehicle.

It is pointed out that the term "door" is used, in the present description and in the ensuing claims, in its widest sense to indicate any element that can move between an opening position and a closing position of an
10 access opening to an internal compartment of a motor vehicle. The aforesaid term therefore comprises the side doors of the motor vehicle, the bonnet or the boot or the hatchback.

BACKGROUND ART

15 As is known, closing systems for doors of motor vehicles basically comprise a lock mounted on the door and a lock striker mounted in a fixed portion of the bodywork in the proximity of the opening of the door itself (or, more rarely, vice versa).

20 The lock comprises a closing mechanism designed to co-operate with the lock striker so as to obtain a relative blocking between the lock and the lock striker itself when the door is closed.

Currently, there is a widespread use of lock
25 strikers of the type comprising a U-shaped element having opposite ends riveted onto a supporting plate.

The U-shaped element is basically made up of two cylindrical portions, which extend orthogonally from the supporting plate and are radiused, on the opposite side, by a connecting portion set transverse to them.

5 The closing mechanism comprises a fork and a pawl or pawl, which are hinged to respective pins fixed to a supporting body designed to be fixed to the door of the motor vehicle.

10 The fork is designed to couple in a releasable way with one of the cylindrical portions of the lock striker, hereinafter referred to as "engagement portion", whilst the pawl or pawl is designed to block the fork, in a releasable way, in a position of closing on the lock striker.

15 In particular, the supporting body and the fork define respective U-shaped seats for housing and blocking the engagement portion of the lock striker. Each of said seats defines, at one end, an entry section for the engagement portion of the lock striker and is
20 delimited, at an opposite end, by a bottom wall, which defines the position of arrest of said engagement portion.

25 The fork is pushed by a corresponding spring in the direction of an opening position, in which it presents the entry section of its own seat facing the same part of the entry section of the seat of the supporting body

so as to enable introduction and extraction of the engagement portion of the lock striker in/from said seats. The said fork can be turned about its own pin in order to assume the aforesaid closing position, in which
5 a portion of the side edge of the seat intercepts the seat of the supporting body so as to block the engagement portion of the lock striker within the seats themselves.

The pawl is designed to couple by snap action with
10 the peripheral edge of the fork in order to block the fork itself, in a releasable way, in the closing position, and is loaded by a corresponding spring in the direction of said peripheral edge.

Typically, entry of the engagement portion of the
15 lock striker into the seat of the supporting body is guided by the walls that delimit the seat itself at the sides, the said walls presenting a profile that converges in the direction of the bottom wall.

In order to reduce the noise produced by coupling
20 between the lock striker and the lock, there are currently adopted constructional solutions based mainly upon the use of a buffer or damper, which is typically made of rubber and is set inside the seat of the supporting body and is coupled to the bottom wall of the
25 seat itself so as to define a damped striking arrest for the engagement portion of the lock striker.

On account of the curvilinear conformation of the engagement portion of the lock striker, distribution of the contact pressures between the external surfaces of the engagement portion and of the buffer is not uniform.

5 In particular, the contact pressure is maximum in an area corresponding to an intermediate portion of the buffer and decreases markedly towards the opposite side edges of the latter.

Over time, this may cause tearing of the buffer,
10 with adverse effects on retention of the lock striker and on the damping action performed by the buffer. Furthermore, this phenomenon may cause an undesired increase in play between the dimensions of the door and the corresponding opening for receiving the door, which
15 is provided in the bodywork of the motor vehicle, with consequent generation of noise and possible rattling of the door when the vehicle is travelling.

DISCLOSURE OF INVENTION

The purpose of the present invention is to provide
20 a lock for a door of a motor vehicle, which will enable, in a simple and inexpensive way, to reduce the noise generated by coupling between the lock itself and the corresponding lock striker.

According to the present invention, a lock is
25 provided for a door of a motor vehicle, said lock comprising: a closing mechanism designed for coupling

with a lock striker along a direction of relative coupling; a supporting body of said closing mechanism presenting a housing seat for an engagement portion of said lock striker; and elastically compliant arrest
5 means delimiting said housing seat at least in the aforesaid direction of relative coupling in order to define damped arrest of said engagement portion of said lock striker; said lock being characterized in that said arrest means are coated on their surface, in the area of
10 interaction with said engagement portion of said lock striker, by a rigid protective shield.

BRIEF DESCRIPTION OF THE DRAWINGS

For a better understanding of the present invention, there follows a description of a preferred
15 embodiment, provided purely by way of non-limiting example, and with reference to the attached drawings, in which:

- Figure 1 is a top plan view, with parts removed for reasons of clarity, of a lock for a door of a motor
20 vehicle built according to the present invention and coupled with a fixed lock striker; and

- Figure 2 is a perspective view, at an enlarged scale, of a damping buffer of the lock illustrated in Figure 1 for receiving the lock striker.

25 BEST MODE FOR CARRYING OUT THE INVENTION

With reference to Figure 1, the number 1

designates, as a whole, a lock built according to the present invention.

The lock 1 is designed to be mounted on the door (not illustrated) of a motor vehicle (not illustrated) and to couple to a fixed lock striker 2, which is fixed to an upright of the body of the motor vehicle (not illustrated) to provide for closing of the door. The lock striker 2 is illustrated in just one of its portions 3 that interacts with the lock, the said portion presenting a cylindrical conformation with axis A.

The lock 1 comprises a supporting body 4 having a box-like shape and designed to be rigidly fixed, in a known way, to the door of the motor vehicle and having a substantially U-shaped opening 5 for receiving the portion 3 of the lock striker 2, and a closing mechanism 6 (illustrated with a dashed and dotted line to render visible the parts of the supporting body 4 underlying it), which is set inside the supporting body 4 and is designed to couple, via the opening 5 and in a way in itself known, with the portion 3 of the lock striker 2 along a direction B of relative coupling transverse to the axis A for achieving closing of the door of the vehicle.

In particular, the supporting body 4 comprises a pair of plates 7, 8 made of metal material, which are

substantially plane and are set facing one another and parallel to one another, and a shell 9 made of plastic material set between the plates 7, 8 and defining, inside, an opening 10, which communicates with the outside through the opening 5 and in which there is set the closing mechanism 6.

The opening 5 is made through the plate 8 and the shell 9 of the supporting body 6 and defines, at one end, an entry area 11 for the portion 3 of the lock striker 2. The opening 5 is delimited, at an end opposite to the entry area 11, by a bottom wall 12 orthogonal to the direction B and, laterally, by a pair of walls 13 set transverse to the wall 12. More precisely, the walls 13 have first plane portions 14 extending orthogonally from respective end edges of the bottom wall 12, and second plane and oblique portions 15, which diverge with respect to one another starting from the portions 14 and which form with the portions 14 respective projections 16 facing towards the inside of the opening 5. Consequently, the opening 5 has, starting from the entry area 11, a section that decreases progressively towards the area of the projection 16, from which it widens out sharply towards the portions 14 of the walls 13 to assume, along the portions 14, a constant cross section.

The closing mechanism 6 comprises, in a known way,

a fork 20 and a pawl 21 hinged to respective pins 22, 23, which extend between the plates 7 and 8 and are set on opposite sides of the opening 5. The pins 22, 23 are rigidly fixed to the plates 7, 8 and have respective
5 axes parallel to the axis A of the portion 3 of the lock striker 2 and orthogonal to the plates 7 and 8.

The fork 20 is formed by a shaped metal plate coated with plastic material, is hinged at one of its own intermediate portions to the pin 22, and has a U-
10 shaped peripheral seat 24 designed for being engaged by the portion 3 of the lock striker 2 and delimited laterally by a pair of teeth 24, 26.

The fork 20 is normally maintained by a spring (not illustrated) in an opening position (not illustrated
15 either), in which it presents its own seat 24 oriented on the same side as the opening 5 of the supporting body 4 so as to enable engagement and disengagement of the portion 3 of the lock striker 2.

Under the thrust of the lock striker 2 and
20 following upon slamming of the door, the fork 20 rotates about the axis of its own pin 22 from the opening position to a closing position (Figure 1), where the portion 3 of the lock striker 2 is blocked in the seat 24, and the tooth 25 intercepts the opening 5 in a known
25 way, preventing it from coming out.

The pawl 21 is formed by a shaped metal plate,

which is coated with plastic material and extends on the same plane of lie as the fork 20 and at one side of the latter. The pawl 21 has an L-shaped lateral projection 27, which is designed for snap coupling with the tooth 5 26 of the fork 20 so as to block the fork 20 in a releasable way in the closing position.

The pawl 21 is pushed, in a known way, in the direction of the fork 20 by a cylindrical helical spring 28 acting against one side of the pawl 21 opposite to 10 the side from which the projection 27 extends.

Advantageously, inside the opening 5 of the supporting body 4, between the area of the projections 16 and the bottom wall 12, is housed a pad or buffer 30, made of elastically compliant material and defining a 15 damped arrest for the portion 3 of the lock striker 2 so as to reduce the noise produced by the coupling between the lock striker 2 and the lock 1.

In particular, the buffer 30 is formed by a substantially prismatic block or pad made of elastomeric 20 material having an end surface 31 set so that it bears upon the bottom wall 12 of the opening 5 and opposite lateral surfaces 32 set so that they bear upon the respective walls 13 of the opening 5.

The buffer 30 (see Figure 2) is delimited, on the 25 opposite side of the end surface 31, by an end edge 33 for receiving the portion 3 of the lock striker 2, the

said end edge having an arched and concave conformation.

Coupling of the buffer 30 with the supporting body 4 is obtained by coupling of a projection 34, which extends in cantilever fashion from the end surface 31 of the buffer 30 with a groove having a complementary conformation made in the bottom wall 12 of the opening 5. As may be seen from Figure 1, in order to ensure retention of the buffer 30 in the direction B, the projection 34 has opposite lateral edges that are oblique and converge with respect to one another towards the end surface 31.

The buffer 30 further has, in an intermediate position, a slot 36, which is elongated in a direction transverse to the lateral walls of the opening 5, the said slot 36 being designed to enable elastic bending of the end edge 33 of the buffer 30 during impact with the portion 3 of the lock striker 2.

According to an important characteristic of the present invention, the end edge 33 of the buffer 30 is coated on the surface by a rigid protective shield or plate 40, which has the function of enabling an even distribution of the impact load of the portion 3 of the lock striker 2 over the entire surface of the end edge 33, thus eliminating any risk of tearing of the buffer 30.

The shield or plate 40 is also U-shaped and has

opposite lateral edges 41 folded on the buffer 30. In particular, the plate 40 is preferably fixed by forcing on the buffer 30.

According to a preferred embodiment of the present
5 invention, the plate 40 has, in the area of interaction with the portion 3 of the lock striker 2, a surface coating made of ceramic material with a low coefficient of friction. The said coating prevents generation, while the motor vehicle is travelling, of any squeaking
10 deriving from the possible relative sliding between the portion 3 of the lock striker 2 and the plate 40 in the direction of the axis A.

Finally, it is clear that modifications and variations can be made to the lock 1 described and
15 illustrated herein, without thereby departing from the sphere of protection of the present invention.

CLAIMS

1. A lock (1) for a door of a motor vehicle comprising: a closing mechanism (6) designed for
5 coupling with a lock striker (2) along a direction (B) of relative coupling; a supporting body (4) of said closing mechanism (6) presenting a housing seat (5) for an engagement portion (3) of said lock striker (2); and elastically compliant arrest means (30) delimiting said
10 housing seat (5) at least in the aforesaid direction (B) of relative coupling in order to define damped arrest of said engagement portion (3) of said lock striker (2); said lock (1) being characterized in that said arrest means (30) are coated on their surface, in the area of
15 interaction with said engagement portion (3) of said lock striker (2), by a rigid protective shield (40).

2. The lock according to Claim 1, characterized in that said shield (40) is constituted by a plate.

3. The lock according to Claim 1 or Claim 2,
20 characterized in that said housing seat (5) is U-shaped and in that said arrest means comprise a flexible element (30) fixed on a bottom wall (12) of said housing seat (5) of said supporting body (4).

4. The lock according to Claim 3, characterized in
25 that said flexible element (30) is made of an elastomeric material.

5. The lock according to Claim 3 or Claim 4, characterized in that said flexible element (30) and said shield (40) have, in the area of interaction with said engagement portion (3) of said lock striker (2), a U-shaped conformation.

6. The lock according to any one of Claims 3 to 5, characterized in that said shield (40) is fixed by forcing on said flexible element (30).

7. The lock according to any one of the preceding claims, characterized in that said shield (40) has, in the area of interaction with said engagement portion (3) of said lock striker (2), a surface coating of ceramic material.

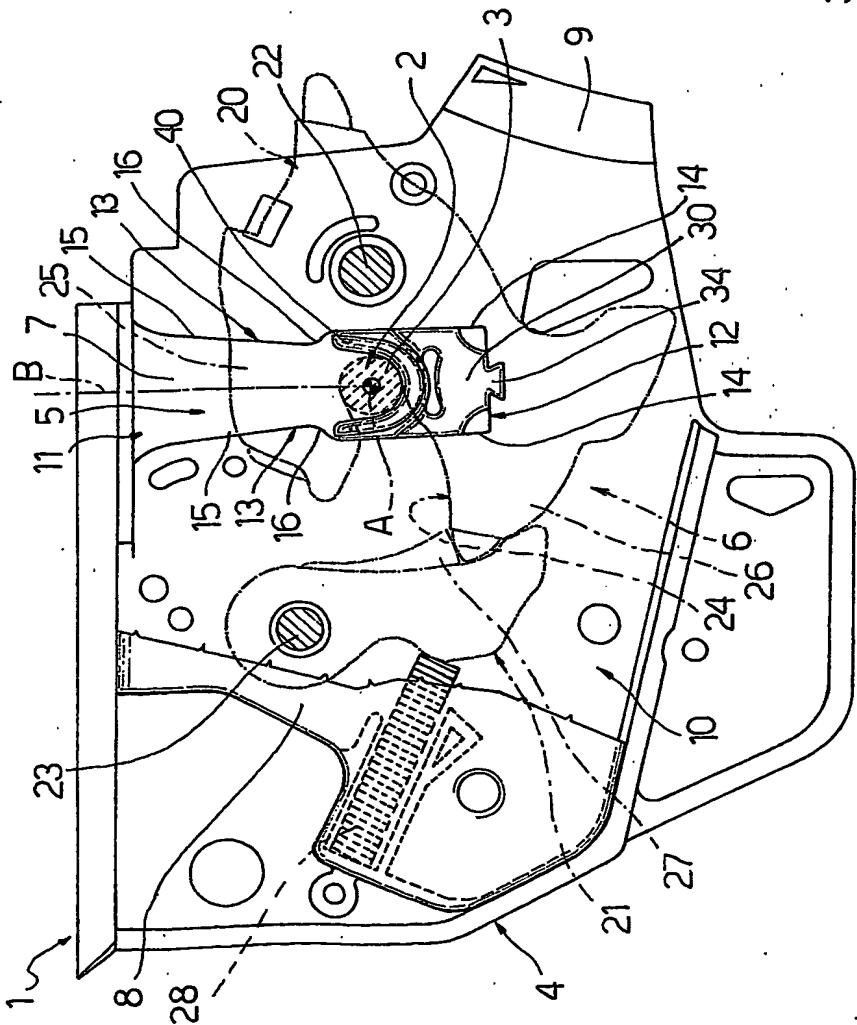


Fig.1

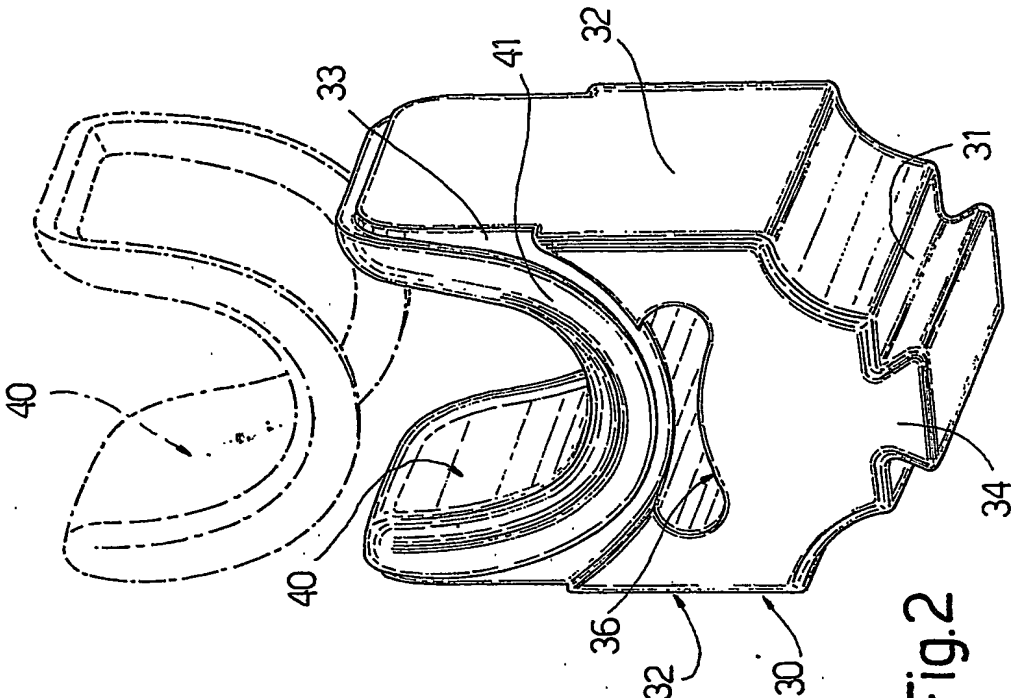


Fig.2

INTERNATIONAL SEARCH REPORT

International Application No

PCT/IT 03/00369

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 E05B65/32

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 E05B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the International search (name of data base and, where practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 22 11 161 A (ARN.KIEKERT SÖHNE) 20 September 1973 (1973-09-20) the whole document ---	1-5
X	FR 2 498 238 A (REGIE NATIONALE DES USINES RENAULT) 23 July 1982 (1982-07-23) the whole document ---	1,2
X	US 3 848 911 A (WATERMANN ET AL.) 19 November 1974 (1974-11-19) the whole document ---	1,2
X	DE 22 20 677 A (ARN. KIEKERT SÖHNE) 8 November 1973 (1973-11-08) page 6; figure 5 --- -/-	1,2



Further documents are listed in the continuation of box C.



Patent family members are listed in annex.

* Special categories of cited documents:

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
- *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

- *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- *Z* document member of the same patent family

Date of the actual completion of the international search

6 November 2003

Date of mailing of the international search report

13/11/2003

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Westin, K

INTERNATIONAL SEARCH REPORT

International Application No

PCT/IT 03/00369

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5 918 918 A (MOSLEY) 6 July 1999 (1999-07-06) the whole document ----	1
A	US 5 727 825 A (SPURR) 17 March 1998 (1998-03-17) the whole document ----	1
A	FR 2 786 524 A (VALEO SECURITE HABITACLE) 2 June 2000 (2000-06-02) the whole document ----	1
A	US 5 348 355 A (OYHA) 20 September 1994 (1994-09-20) column 4, line 44 - line 46 -----	7

INTERNATIONAL SEARCH REPORT

International Application No

PCT/IT 03/00369

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
DE 2211161	A	20-09-1973	DE 2211161 A1	20-09-1973
			FR 2175434 A5	19-10-1973
			GB 1369182 A	02-10-1974
			IT 981172 B	10-10-1974
			JP 966070 C	26-07-1979
			JP 48100813 A	19-12-1973
			JP 53045968 B	11-12-1978
			US 3848911 A	19-11-1974
FR 2498238	A	23-07-1982	FR 2498238 A1	23-07-1982
US 3848911	A	19-11-1974	DE 2211161 A1	20-09-1973
			DE 2218734 A1	31-10-1973
			FR 2175434 A5	19-10-1973
			GB 1369182 A	02-10-1974
			IT 981172 B	10-10-1974
			JP 966070 C	26-07-1979
			JP 48100813 A	19-12-1973
			JP 53045968 B	11-12-1978
DE 2220677	A	08-11-1973	DE 2220677 A1	08-11-1973
US 5918918	A	06-07-1999	NONE	
US 5727825	A	17-03-1998	GB 2282843 A	19-04-1995
			AU 7818294 A	04-05-1995
			DE 69409002 D1	16-04-1998
			DE 69409002 T2	23-07-1998
			EP 0723620 A1	31-07-1996
			ES 2115980 T3	01-07-1998
			WO 9510679 A1	20-04-1995
			JP 9506942 T	08-07-1997
FR 2786524	A	02-06-2000	FR 2786524 A1	02-06-2000
US 5348355	A	20-09-1994	JP 5049977 U	02-07-1993
			JP 5049979 U	02-07-1993
			JP 5049978 U	02-07-1993
			KR 9602072 Y1	14-03-1996